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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/936,122	09/06/2001	Thomas Bieringer	MO-6585/LEA 33,633	9409

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EXAMINER	
ANGEBRANNDT, MARTIN J	
ART UNIT	**PAPER NUMBER**
1756	

DATE MAILED: 04/11/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/936,122	BIERINGER ET AL.	
	Examiner	Art Unit	
	Martin J. Angebranndt	1756	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 February 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *23-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *23-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

1. The response provided by the applicant has been read and given careful consideration. Rejections of the previous office action not repeated below are withdrawn based upon the amendments and arguments of the applicant. Responses to the arguments of the applicant are presented after the first rejection to which they are directed.

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 23-26 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The method claim does not set forth any steps. The claims should recite an interference exposure using two beams as discussed on page 1 at lines 6-20 of the instant specification. See MPEP 2173.05(q).

Currently, the claims do not require multiple holograms to be recorded, but merely that ".... the dye permits the recording of at least three holograms at one specimen position..." If the applicant means to claim a process of recording multiple holograms, then the plural exposure steps need to be recited.

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 23-26 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for forming multiple holographic images using two beam interference

exposures, does not reasonably provide enablement for forming holograms in other ways. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to practice the invention commensurate in scope with these claims.

The claims should recite an interference exposure using two beams as discussed on page 1 at lines 6-20 of the instant specification. See MPEP 2172.01

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claim 23-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bieringer et al. '846, in view of Savant et al. '221, Kawano et al. '890, Colvin et al. '648 and Ross '663, further in view of.

Bieringer et al. '846 disclose azo monomers embraced by formula II in columns 4-6. See the liquid crystalline monomers, which exhibit shape anisotropy in columns 6-7 . See also general formulae I and II. The recording of holographic images (gratings) is disclosed. (9/37-41) and the images are described as changing the refractive index (birefringence), which makes them volume images, rather than surface images (9/42-51). The formation of films of thicknesses of 0.1 and 1 mm is disclosed. (21-23). The use of copolymers is shown in polymers 4, 6-8, and 10-12 using azo monomer 7. The use of injection techniques is disclosed. (inflow). The copolymerization of the monomers containing photoactive side chains with other ethyleneically

unsaturated monomers, such as acrylates and methacrylates is disclosed. (7/48-8/28). The use of co-monomers which include shape anisotropic moieties as side groups is disclosed in column 6 at line 50 through column 7/line 47.

Savant et al. '221 in example IV uses dye concentrations of 4.5 to 25% in polyvinyl alcohol. Examples V describes the azo dyes bound to a polyethylene vinyl alcohol backbone and coated to a thickness of 10 microns. Examples XIII to XX describe thicknesses of 10 to 150 microns (0.1 to 0.15 mm) with dye loading concentrations of 10% as the best (23/53-55). The storage of multiple holograms in the same spot by controlling the angle between the incident (object) and reference beams is disclosed. (25/46-57 and 7/11-15). Suitable polymers are disclosed in columns 8-10. Useful azo dyes are disclosed in columns 9-17. The formation of thicknesses of 10-1000 microns (1 mm) by spin coating is disclosed. (18/51-66). The images induces are based upon birefringence (26/6-23) The formation of 32 different patterns per spot is disclosed. (7/11-18)

Kawano et al. '890 teach azo used in holographic recording media to record polarization sensitive holograms.. The use of thicknesses of at least 10 microns is disclosed. There is a preference that they be thicker to store more information, with 1 mm thicknesses able to store as much as 100 DVDs. (8/30-34).. The use of multiplexing in recording holograms in azo based holographic recording media is disclosed, particularly shift multiplexing. (1/39-2/30)

Colvin et al. '648 teach that as thickness increase so does the diffraction efficiency of the medium and the ability to store more holograms dues to facilitating bragg angle selection (angular multiplexing).

Ross '663 teaches holographic recording media which are 1 cm thick in the examples.

It would have been obvious to one skilled in the art to modify the examples of Bieringer et al. '846 cited by angularly multiplexing holograms during recording and reading them out to increase the amount of information recorded in the hologram, thereby increasing it's utility as taught by Savant et al. '221 and Colvin et al. '648 and to increase the thickness of the recording media to at least 1 mm as taught by Kawano et al. '890 and Colvin et al. '648 to increase their potential diffraction efficiency and their ability to angularly multiplexing holograms during recording and read out thereby increasing the amount of information recorded in the hologram and it's utility. Further it would have been obvious to use either angular multiplexing or polarization multiplexing to record several holograms in the same portion of the resultant medium and to use thicknesses of up to 1 cm as taught by Ross '663 to based in part upon the direction to thicker media to allow more storage capacity as taught by Kawano et al. and Colvin et al. '648.

The applicant correctly argues that multiplexing of holograms is not taught in Bieringer et al. '846, but the examiner does to base the rejection merely upon Bieringer et al. '846. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). The examiner has relied upon Savant et al. '221, Kawano et al. '890 and Colvin et al. '648 to teach multiplexing as allowing increased amounts of information to be able to be stored in the same recording medium and specifically Savant et al. '221and Kawano et al. '890 to show that this is known for azo dye based holographic recording media. Savant et al. teaches the **storage of multiple holograms in**

the same spot by controlling the angle between the incident (object) and reference beams is disclosed (angular multiplexing). This is different from the successive overwriting by erasure as evidenced by the text. The examiner notes that the effects of thickness on the capacity of volume holographic recording media is recognized in the art and the Ross '663 is a volume holographic recording medium and establishes useful thicknesses include 1 cm. The applicant is arguing that with increased thickness, optical density becomes an issue. The examiner notes that this is much less of a problem when polarization of the beams is used as only a fraction (~ 1/3) of the azo sidechains would be in the appropriate orientation to absorb the incident light (their dipole moments have to be parallel to the electric field of the polarized light). The examiner also notes that references cited do not require that the wavelengths used be at the absorption maxima of the polymeric azo dyes, but only that the light be absorbed which reduces the effects of any alleged high absorptivity. Also the teachings of Ross et al. is that thicknesses of up to 1 cm would be expected to be useful. If the applicant has data/evidence that this is not the case, then it should be made of record. The rejection stands.

The applicant argues that the holographic recording media of Bieringer et al. '846 and Savant et al. '221 and their teachings are not combinable. The system in example 1 of Savant et al. is a guest host system, where the azo dye is a small molecule not teathered to a polymer backbone and so clearly has a greater freedom of motion. The heating removes more of the solvent and raises the Tg of the composition. A more reasonable comparision would be with example4, which does not describe the heating after the coating. The applicant will note that example VI also does not describe the heating, but other examples corresponding to a guest host system do (examples II, VII). The applicant's position that the references are incompatible fails

to account for the fact that both are directed to holographic recording using azo dyes, with each including teachings of the use of polymer bound azo dyes. The information is stored by exactly the same isomerization across the azo bond. Also the claims do not preclude any drying steps. Indeed the instant specification in examples 5 of the instant specification describes heating is used during the coating process. Therefore, the position of the applicant is without merit and the rejection stands.

8. Claim 23-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bieringer et al. '846, in view of Savant et al. '221, Kawano et al. '890, Colvin et al. '648 and Ross '663, further in view of Mok et al. WO 97/01133.

Mok et al. WO 97/01133 teaches the use of various multiplexing techniques in holography incluidng angular, fractal, peristrophic, shift, phase-code and wavelength multiplexing. (page 5/lines 3-22 and page 20/line 3 through page 21/line 8)

In addition to the basis provided above, the examiner holds that it would have been obvious to use other multiplexing techniques known in the art as useful in holography in place or in addition to the angular multiplexing described by Savant et al. '221 in the invention rendered obvious by the combination of Bieringer et al. '846, in view of Savant et al. '221, Kawano et al. '890, Colvin et al. '648 and Ross '663 with a reasonable expectation of forming multiplexed holograms.

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Pu et al. '365 teach angular, peristrophic and wavelength multiplexing as known in holography. (1/ 32-67)

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Martin J. Angebranndt whose telephone number is 571-272-1378. The examiner can normally be reached on Monday-Thursday and alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Martin J Angebranndt
Primary Examiner
Art Unit 1756

04/06/2006